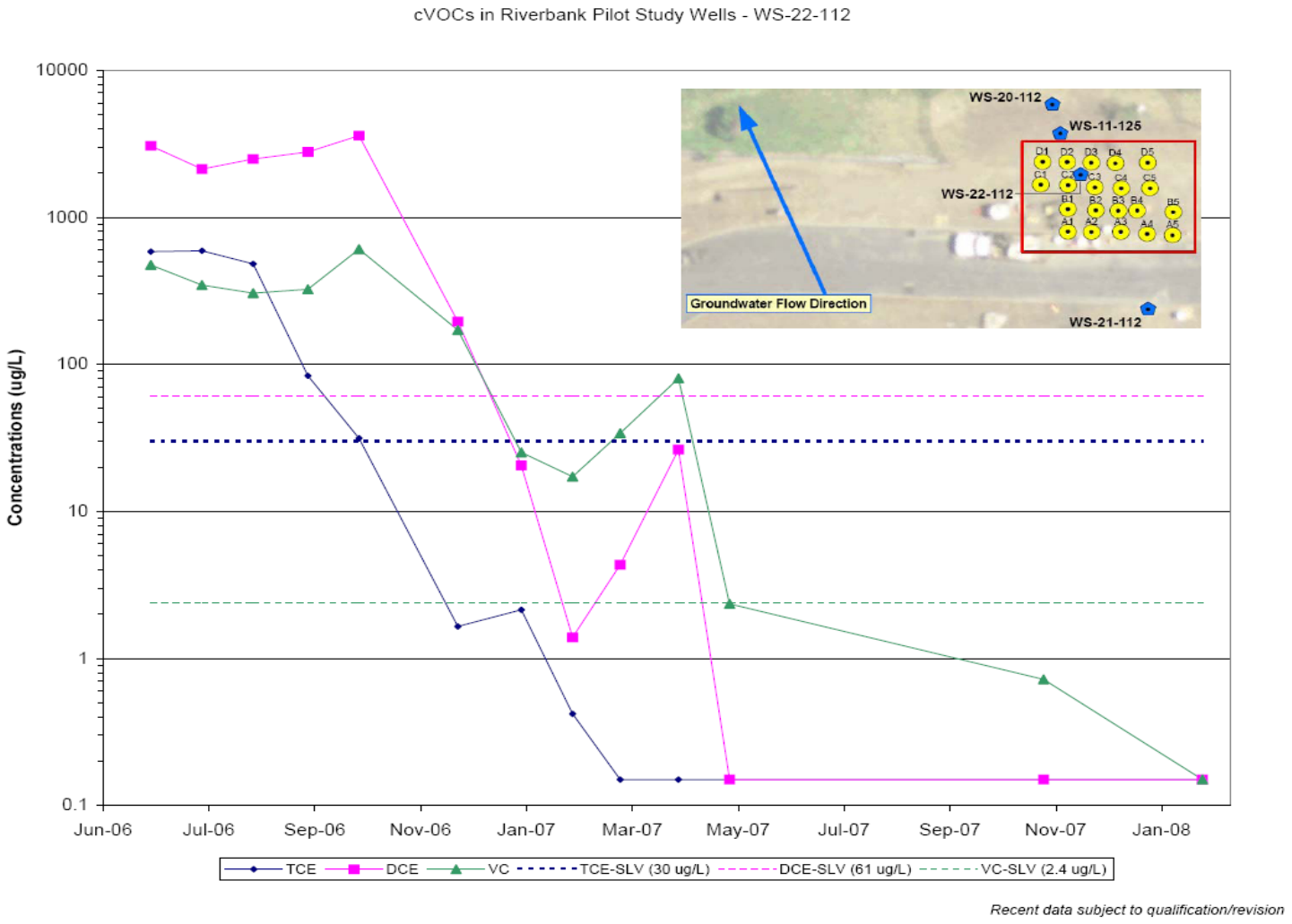
EIB Technology

- EIB involves 2 steps:
  - Injecting a slurry of 50% (by weight) controlled release carbon and 50% zero-valent iron (i.e., EHC) to pre-condition the subsurface; and
  - Bioaugmentation with a commercial culture of dehalobacteria (i.e., KB-1)
- EHC promotes:
  - Strong reducing conditions (-150 to -250 eV), favorable to bacterial growth
  - Dechlorination of TCE by ZVI
- KB-1 culture contains microbes capable of dechlorinating TCE and its degradation products to ethene

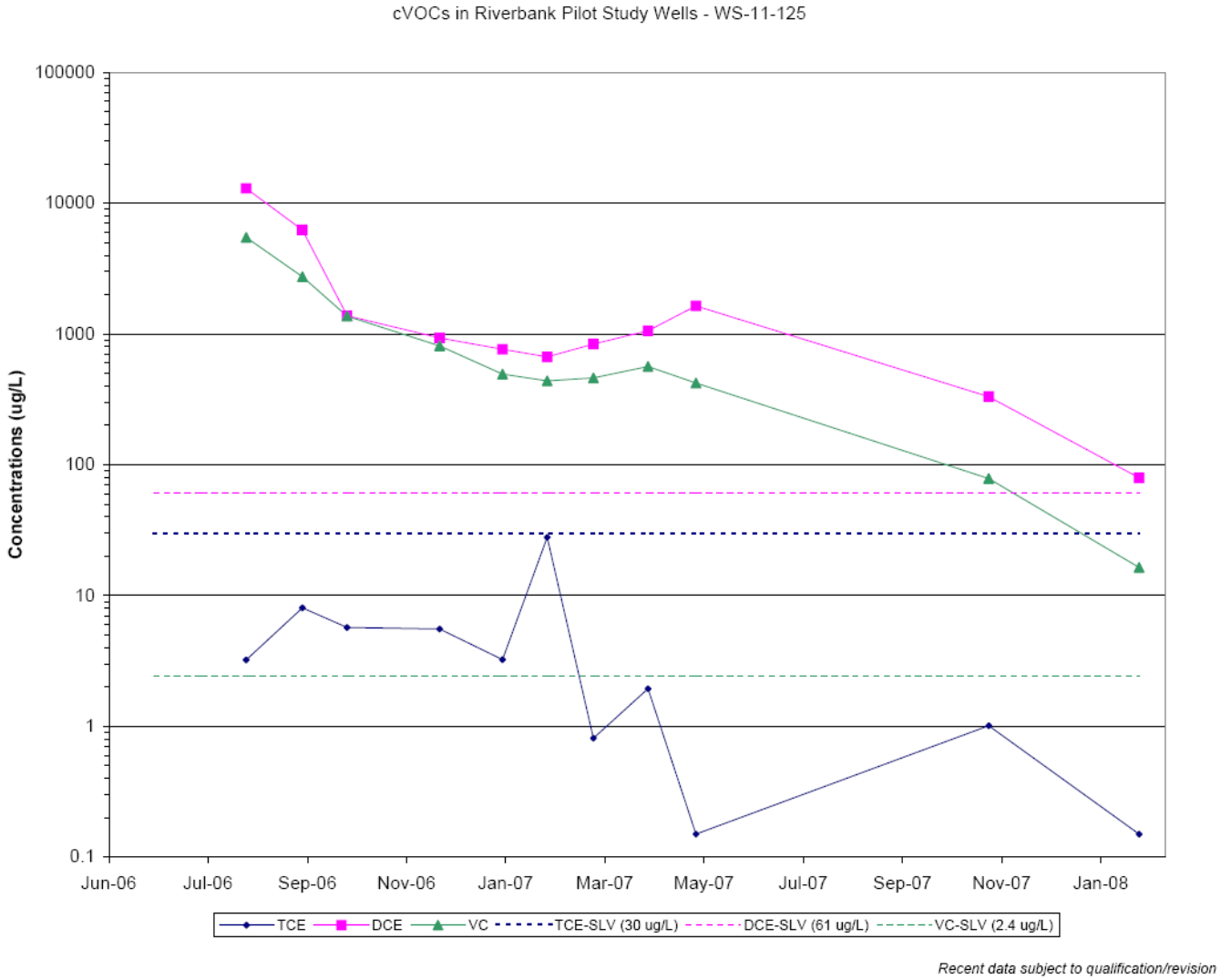
EIB Effectiveness

- Pilot studies in release area and near riverbank suggest EIB is effective at reducing cVOC concentrations
- Concentrations of TCE, cis-1,2-DCE, and VC decrease significantly

Riverbank Data, WS-22-112 (most positive)



Riverbank Data, WS-11-125 (less positive)



Recent data subject to qualification/revision

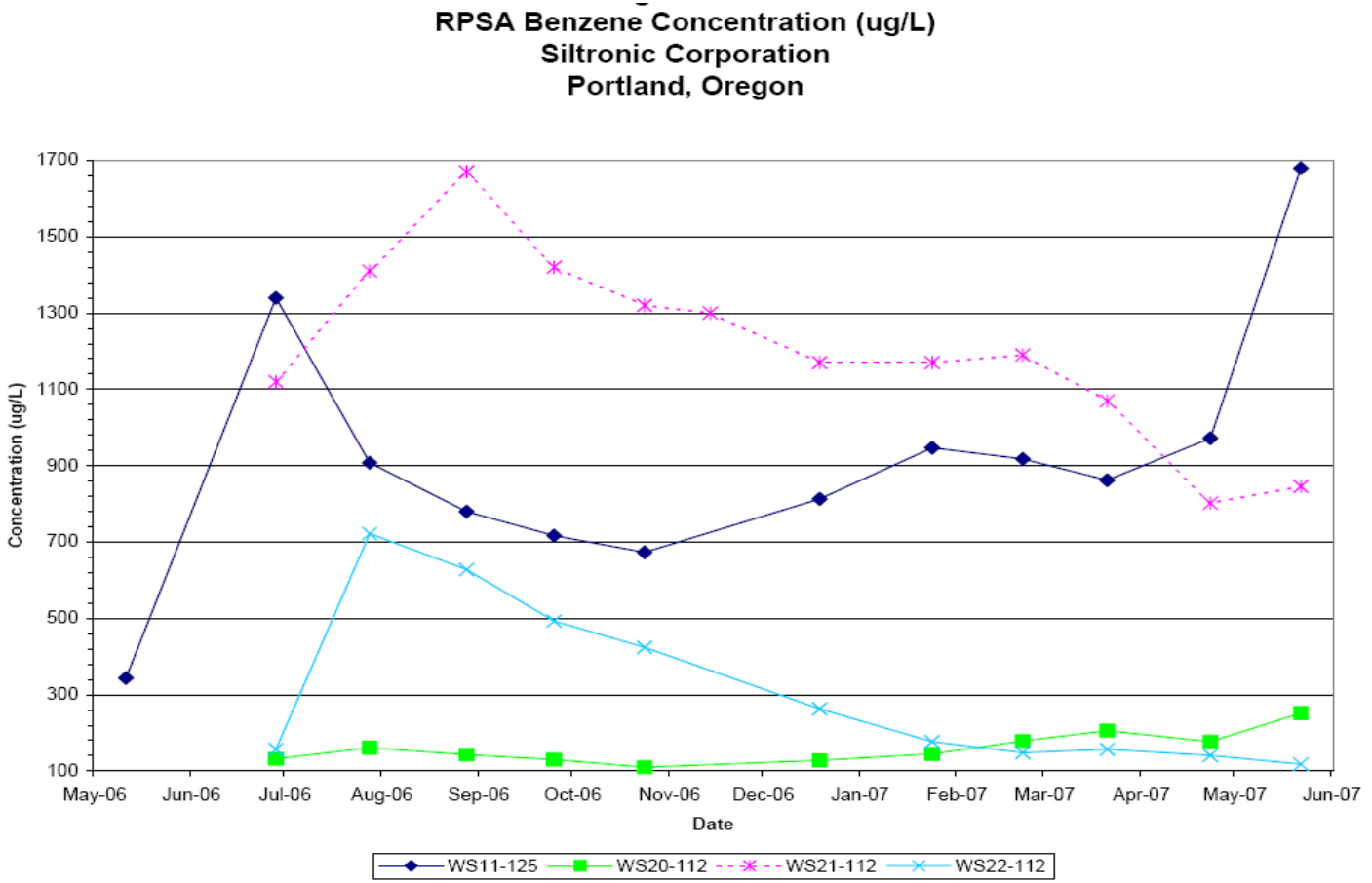
Siltronic's Conclusions

- EIB will be effective at the riverbank
- Concentrations of TCE and its degradation products in TZW could be significantly reduced
- Resultant front of treated groundwater would likely travel beyond the hydraulic influence of a barrier wall/extraction system within approximately 12 months after installation of an EIB PRB
- Low potential for impacting the river
- Properly sequenced, combining EIB and a vertical barrier would maximize the environmental benefit of contaminant concentration reduction

DEQ's Position

- Siltronic must meet a very high threshold for showing EIB at the riverbank is an effective compatible SCM alternative
- DEQ would consider use of EIB if the FFS could show conclusively that: 1) the overall schedule for implementing well/wall SCMs would not be delayed; 2) reduction in risk associated with decrease in dissolved phase VOCs justifies the risk of implementation (e.g., EIB would not interfere with well/wall SCM or result in unacceptable discharges to the river); and 3) there is a clear benefit of EIB over natural biodegradation and/or other measures (e.g., capping)
- Each criteria contain more specific issues that would need to be considered and resolved.
  - Example: potential for EIB to interfere with wells/wall SCMs needs to consider/resolve location and alignment conflicts, decrease in operational capacity of wells, and reduction in treatment system effectiveness

EIB and MGP



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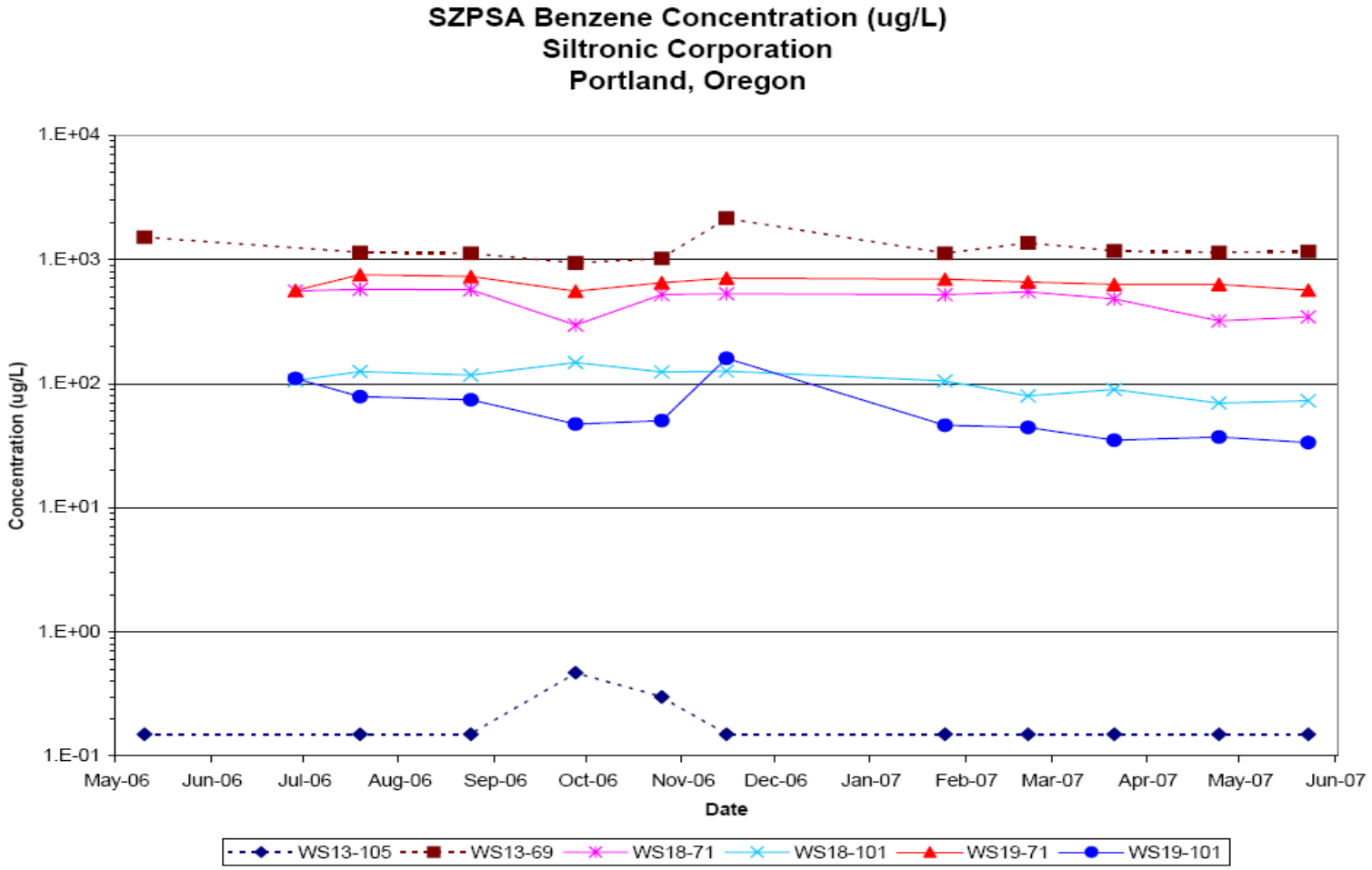
EIB and MGP (cont.)



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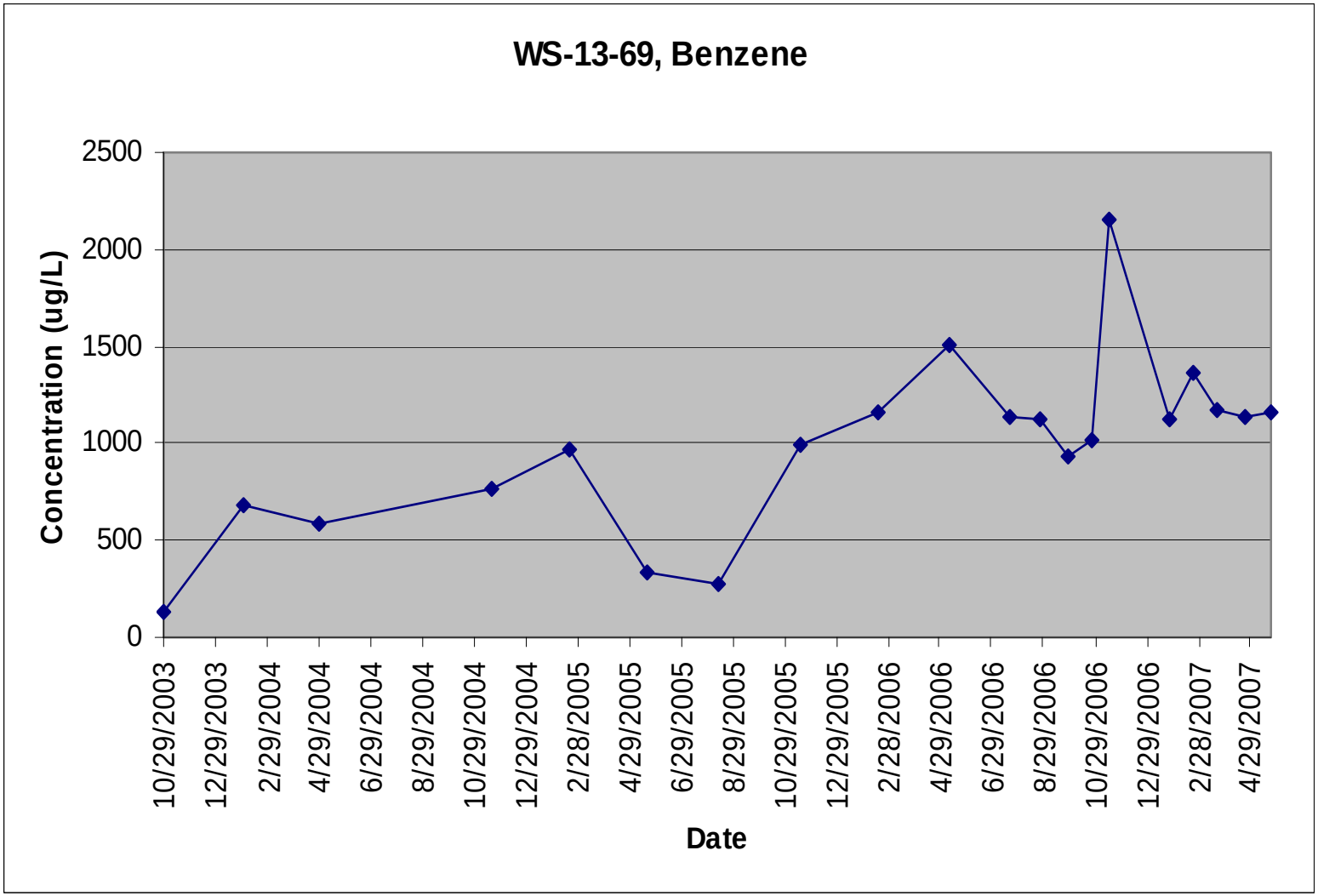
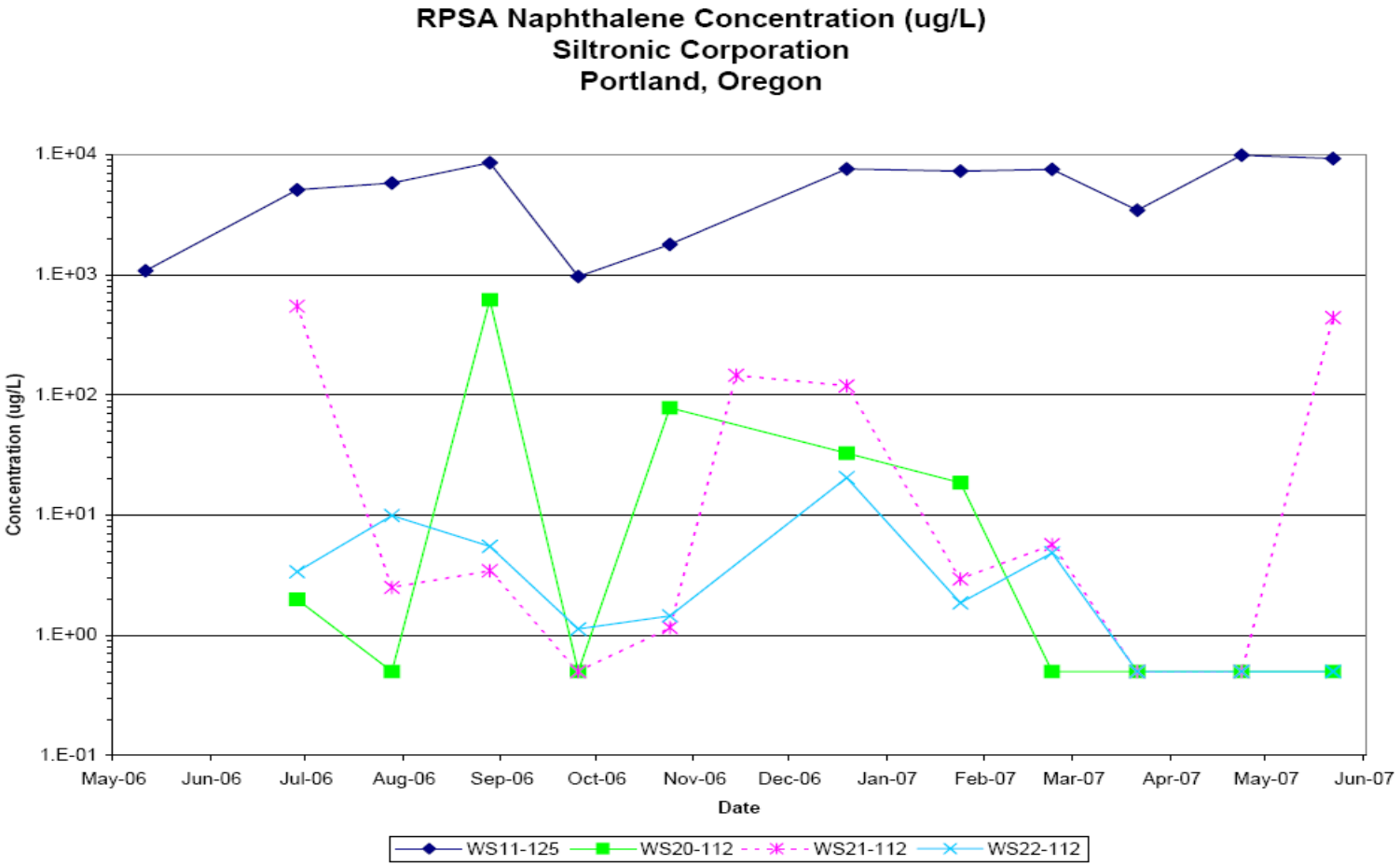
EIB and MGP (cont.)



EIB and MGP (cont.)



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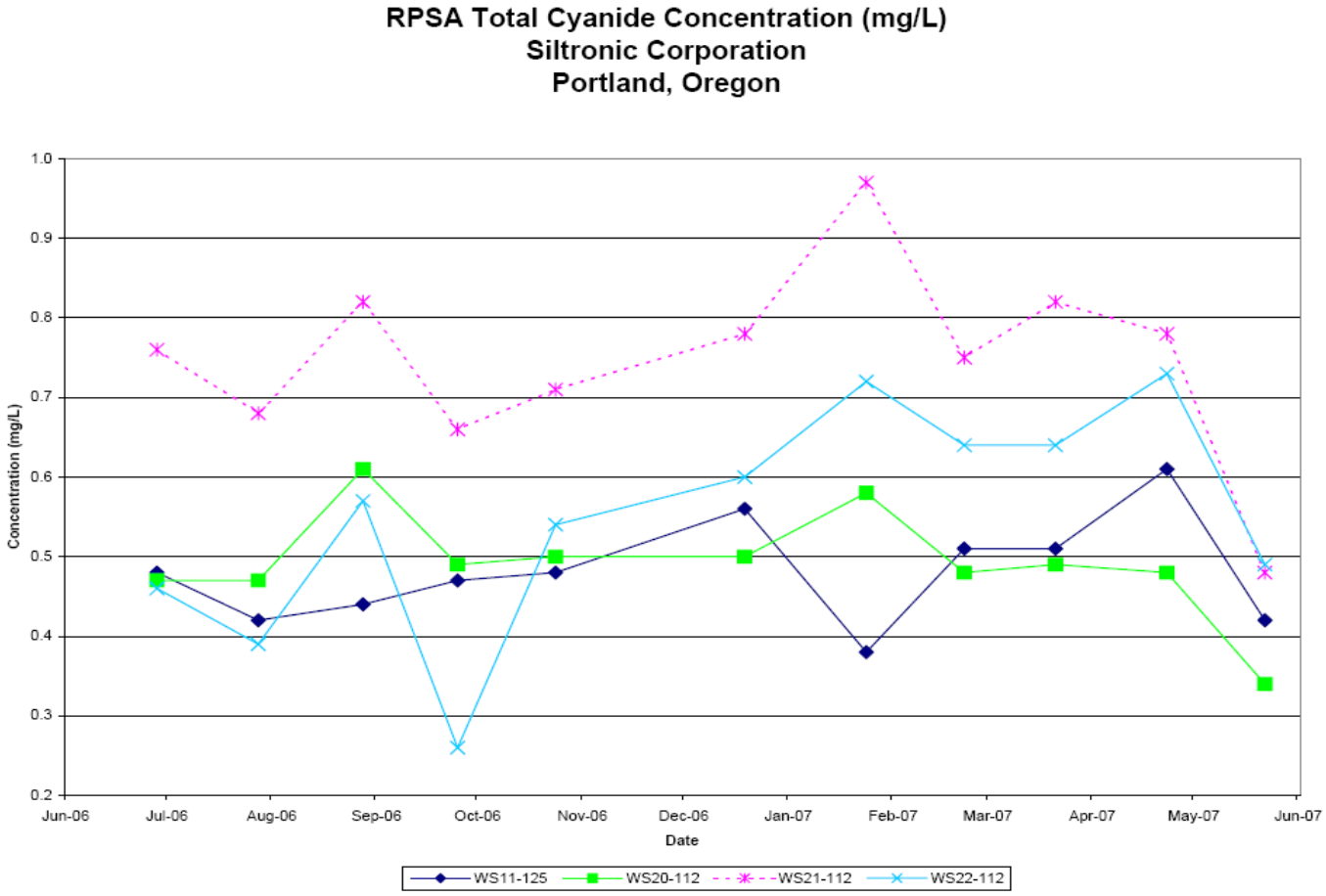
EIB and MGP (cont.)



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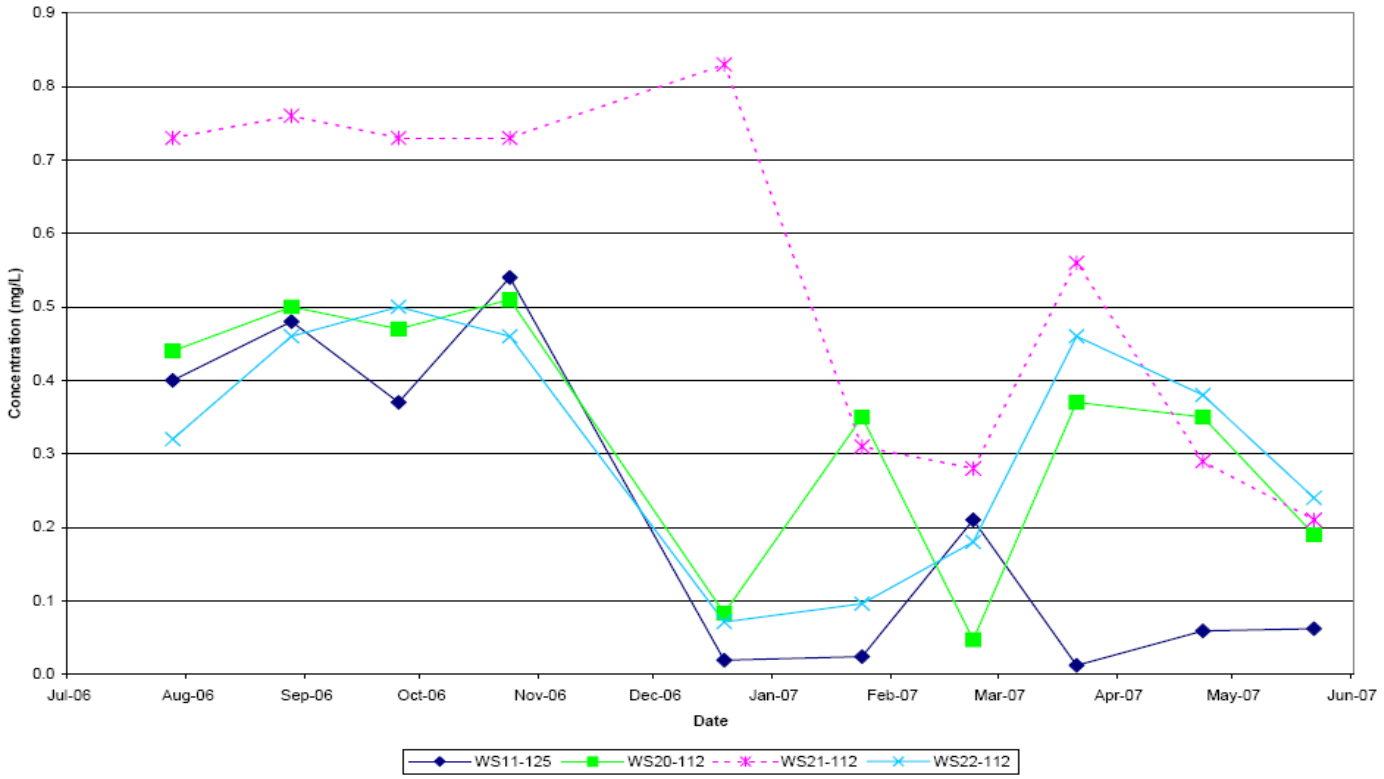
EIB and MGP (cont.)

RPSA Free Cyanide Concentration (mg/L)
Siltronic Corporation
Portland, Oregon



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